helion passage occurred on the same day of April, Encke was very doubtful of the comet being visible at all in this hemisphere, and had contented himself with transmitting an ephemeris to Greenwich, to be passed on to the Cape of Good Hope. It was only after Dr. Galle had detected with the Berlin refractor, on the evening of February 8, a very faint nebulosity within 2′ of the predicted position of the comet, that Encke communicated the ephemeris to the *Astronomische Nachrichten* (see No. 443). In 1842, on March 23, the comet was seen "distinctly in the twilight, with the moon shining brightly." At the beginning of the second week in April the condensation of light was very great, and a fine bright point was remarked: it was not seen in Europe after the 9th of this month.

BEARING OF METEOROLOGICAL RECORDS ON A SUPPOSED CHANGE OF CLIMATE IN SCOTLAND *

IT is a belief very generally entertained that the climate of Scotland has undergone considerable change in recent years, the summers being less hot and the winters less severe than they used to be. This idea was advocated by Mr. M'Nab in his presidential address to the Edinburgh Botanical Society in November 1873, the facts adduced in support of it referring solely to vegetation. In this paper the question is examined exclusively from a meteorological point of view, and the examination is confined to monthly mean temperatures.

The following are the records which have been made use of:—1. Monthly mean temperatures from observations made at Gordon Castle, Banffshire, from July 1781 to November 1827; 2. The monthly temperatures given in Forbes' climate of Edinburgh (Trans. Roy. Soc. Edin., vol. xxii. p. 335); 3. Observations made at Dollar from 1836 to 1856, and from 1861 to 1874; and 4. Observations made at Elgin from 1855 to 1874. The mean temperatures of the months and the year were calculated for each of these four series of observations for the interval embraced by each, and then the differences of each month's mean temperature from the general mean for that month and station were set down in a table. Since the time over which each of these series of observations extended was sufficiently long to give a very close approximation to the true mean for the hour of observation and exposure of the thermometers, and since the separate months were only compared with the means for that place, the table may be regarded as representing very closely the *monthly variations* which have occurred in the temperature of Scotland during the past ninety-four years. It may be noted that the observations were made in two districts, viz., Gordon Castle and Elgin in the north, and Edinburgh, Dunfermline, and Dollar in the south.

The variations of each year, and of each month of each year, were then projected in curves, showing graphically the fluctuations which have occurred during this long period. The coldest year was 1782, being 3°·3 under the average, the deficiency of May of that year being 6°·7, and August 5°·9; then follow 1799 and 1816, being 2°·3; 1838, being 2°·0; and 1860, being 2°·4 under the average. The two warmest years were 1794 and 1846, the excess being respectively 2°·7 and 2°·9. During the nine years from 1787 to 1795, the temperature was generally above the average; the mean annual excess of the nine years being 1°·5. For the next quarter of a century temperatures were generally under the average. From this period to the present time there have occurred five fluctuations in the annual temperature above and below the average, differing in amplitude and duration, but giving no indication of a steady permanent change either way. Exceptionally warm and exceptionally cold months are distributed over the period in such a manner as to show that substantially no permanent change has taken place in the temperature of any of the months.

Since, however, the eye may not be able easily to detect any steady rise or fall that may be going on owing to the sharply serrated character of the curves, other averages were calculated on the method of taking as the average of, say, January 1784, not the average of that year, but the average of the five years 1782, 1783, 1784, 1785, and 1786. All the averages were dealt with in this way, and the results projected in a set of thirteen new curves. From these consecutive five years' averages, it is seen that mild Decembers prevailed from 1787 to 1797, from 1822 to 1845, and from 1862 to 1867; and cold Decembers from 1798 to 1821, from 1846 to 1861, and from 1868 to the present time. It may be noted that in 1821 the remark might have been made from the previous forty years' observations, that the character of Christmas weather had undergone a great change, the Christmases of the latter part of the period being generally much more severe; and again, in 1843, looking at the long period of forty-seven years, beginning with 1796, it might have been said that the old-fashioned Christmas weather had almost ceased to occur in the latter half of this long period, and that the climate had undergone some great permanent change. Now, while both would have been right as to the facts (whether these facts were based on numerical data or on recollections), both would have been wrong in inferring a permanent change, even though the inference was based on the observations of half a century. Looking, however, at the ninety-four-years' period, we can only conclude that the weather of December, as regards temperature, is subject to large fluctuations, which differ both in intensity and duration, and that there is no tendency to a permanent increase or decrease.

One of the most interesting features of the curves is the similarity existing among them *inter se*. The curves for August and September closely resemble each other, as also do those for November and December, while that for October combines the main features of the two sets. The curve for January combines the main features of the curves for November and December on the one hand and February and March on the other, and so on with the other months.

The general result of the inquiry then is, that though large annual fluctuations of temperature have occurred, yet the warm and the cold cycles, extending over longer or shorter periods, are so distributed over these long intervals as to give no indication that there has been any tendency towards a steady increase or decrease in the temperature, or that any permanent change has taken place in the climate of Scotland. And since the same remark applies with equal force to the observations of the separate months, it follows that meteorological records give no countenance to the idea of a permanent change having occurred in the climate of Scotland either as regards summer heat or winter cold. It may be added that during the past seven years the temperature of July has been above its average respectively 2°·8, 1°·7, 2°·0, 0°·2, 1°·7, 1°·0, and 1°·8, and that of December, as compared with its average + 1°·5, − 4°·2, − 5°·6, − 1°·1, − 0°·8, + 3°·4, and − 7°·4; results quite in the opposite direction of the popularly entertained belief that the summers are colder and the winters milder than formerly.

ALEXANDER BUCHAN

* Abstract of a paper read at the General Meeting of the Scottish Meteorological Society, held on 10th Feb.

NATURAL PHENOMENA IN SOUTH AMERICA *

THE following notes may, I hope, possess some interest for the readers of NATURE. They were made during an expedition which took place last

* Notes of some observations made by a telegraphist during a cable-laying expedition from Pará to Cayenne.

summer, when a cable, designed for the Company by Sir William Thomson and Prof. Fleeming Jenkin, and manufactured by Messrs. Hooper, was laid by the large new telegraph ship *Hooper* between Parà and Cayenne on the coast of South America.

1. *Aspects of the Forests—Unconscious Action of the Sensorium.*—One of the first things which strikes a person at anchor in the Parà River is the increased clearness with which he can distinguish the details of the distant forest on the river's banks after he has repeatedly, but it may be unconsciously, looked at it. At first the forest presents the appearance of a vague dark-green wall uprising from the brimming yellow flood of the river, but by and by the eye clearly traces boughs, shapes, and even differences of tint in the foliage, which before had entirely escaped its observation. It seems, indeed, as if it were true sensitively as well as intellectually, of the eye as well as of the imagination, that "the oftener we looked at things the more we saw in them." It seems as if, within certain limits, the image of an object became more distinct in our consciousness the oftener it impressed itself on the retina, or that our perception became, unconsciously to us, more acute the oftener it was exercised upon the same object. This appears to be true also of the other senses; for example, a chemist has to smell or taste some time before he can discriminate the ingredients of a mixture, and the peculiar cries of the street vendor in time become intelligible to us without any apparent effort on our part.

Within the forests the absence of grass is at once noticeable. The only plant, indeed, resembling grass, is an orchid which grows as if it had been merely tossed up into the trees. It is very like that sharp-edged sword-bladed grass so troublesome to the farmer and difficult to eradicate from his field. The absence of grass may be attributed to the great evaporation and non-retentiveness of the soil, or to the deep shade of the thick underwood.

In the vicinity of Parà I noticed two trees of different species so entirely locked together as to have one common trunk for seventy or eighty feet of altitude. Near Lake George, in North America, there is, I believe, a similar phenomenon, of which the guide, who points it out, wisely remarks, "Whom God hath joined, let no man put asunder."

2. *Thunderstorms.*—Another thing which cannot fail to "strike a stranger" is the prevalence of lightning at Parà. There is a display usually every afternoon. The locality seems to lie between that city and the mouth of the river. Thunder is rarely audible. The flashes are large and of a flame-colour, and proceed out of widespreading dark clouds. It was my good fortune to witness a rain and thunder storm on a large scale there. At every flash a bluish glare suddenly illumined the broad river even to the opposite shore, the flooded streets, the piles of buildings, and the shipping so distinctly that each rope and spar might have been numbered. The flashes succeeded each other with marvellous rapidity, but were not in every case accompanied by audible thunder.

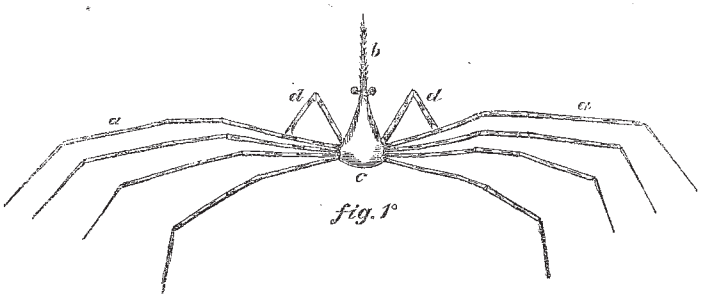
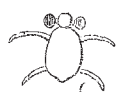


fig. 1°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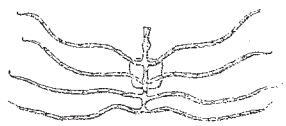


fig. 3°

3. *Flying Fish, "Portuguese men-of-war,"* and some other floaters, were seen most frequently in the morning. The Portuguese man-of-war is then very difficult to distinguish amidst the general unrest of the slate-coloured waves. He is usually found solitary, or with a single companion, in the fleet to which he belongs. I was surprised to find that the larger ones were, however, frequently accompanied by a school of little fishes like sardines, which twinkled around them in the water like so many attendant sprites. Their object in being there was doubtless to get food, but how this is done it is difficult to know.

The flying-fish were sometimes extremely numerous. They turned both horizontal and upward vertical curves in the air during their short flight, which resembles that of a mud-lark. It seemed to me that they vibrated their wings rapidly on first starting, so as to assist them to gain a sufficient height, after which they simply skimmed till they touched water again and gave themselves a fresh impulse. Their wing-power is certainly, as yet, unable to sustain flight, although it is capable of assisting and diverting it.

4. *A Barracouta.*—In the River Parà estuary a fine lusty Barracouta leaped from the water into the ship, a height of ten or twelve feet, nearly striking our chief engineer in the face. He caught it. The back was beautifully chased with dark-green, blue, and gold; the sides and belly with paler green, blue, and gold; and three rows of metallic-looking spots were ranged along the sides like flakes of citrate of iron and quinine. It had a single row of sharp triangular teeth in each jaw.

5. *Phosphorescence.*—This phenomenon was sometimes very beautiful. It owes its appearance, perhaps, not so much to conditions of atmosphere, &c., as to prevalence of the creatures which give rise to it. We remarked the boundaries of a thick colony of them as clearly defined amongst the surrounding population as land is from sea on a map. The usual appearance of this phosphorescence and of the flight of flying-fish are accurately described by the Rev. Canon Kingsley in "At Last."

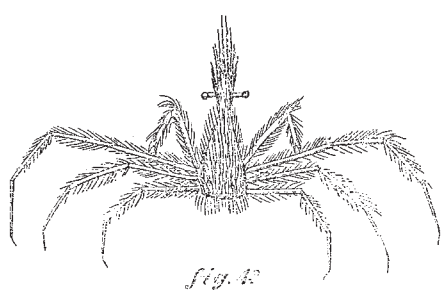
6. *St. Roque Current.*—We found the speed of this current to be as much as four knots an hour sometimes, instead of two and two-and-a-half as marked on the charts. In lat. 3° 42′ N., long. 48° 15′ W., we found it skirting the edge of the fringing reef, and so well defined from the rest of the ocean, that in crossing it the ship was half in current water and half in ocean, and the agitation at the line of demarcation could be seen for miles. At the surface we found its temperature to be 82° F., and at the bottom, 150 fathoms deep, we found the temperature only 59° F.

7. *Live Specimens.*—Off the mouth of the Amazon we had occasion to pick up some cable which had been submerged a little over a month. In the vicinity of the lightship, among the sandy shoals of the River Parà estuary, the cable was completely encrusted with tiny barnacles. Beyond this, and further out at sea, it came up covered with submarine vegetation, crabs, and shells of curious description. Among the latter were a pink, semi-transparent Leda, with onyx-like streaks of white; and a nummulite. The seaweeds were in great variety

clinging to the cable, sometimes in thick groves of red and yellow algæ, slender, transparent, feathery grasses, red, slimy fucoids, and tufts of amethyst moss. We found branching coral plants, upwards of a foot in height, growing on to the cable, the soft skeleton being covered with a fleshy skin, generally of a deep orange colour. Sometimes a sponge was found attached to the roots of these corals, and delicate calcareous structures of varied tints encrusted the stems of all these plants, and served to ornament as well as strengthen them. Parasitic life seems to be as rife under these waters as it is on these shores. Many star-fishes, zoophytes, and curious crabs were likewise pulled in, clinging to the cable. The latter were frequently completely overgrown with the indigenous vegetation of the bottom, or of the colour of the sand there, and so were scarcely distinguishable from it. Others, although not so covered, were found to have the same tints as the vegetation they inhabited, and even in structure resembled the latter somewhat. Others, again, were perfectly or partially transparent; and one most beautiful creature, perhaps new to science, united singularly enough in its person several prevailing colours of the bottom. Its slender limbs (Fig. 1), like jointed filaments of glass, were stained here and there of a deep topaz brown (*a*). Its pointed snout (*b*) was of a deep scarlet; its triangular body (*c*) of a light yellow; its eyes were green, and its tiny hands (*d*) an amethyst blue.

Another very active crab or water-beetle was also picked up. It was quite transparent, and had bright green highly convex eyes (Fig. 2).

Another creature (Fig. 3) of quite a different description was also picked up. It was more like a water-spider than anything else. Its transparent hair-like limbs were dappled with dull green, and it seemed a mere skeleton



framework made to carry a small white sac containing entrails, which was slung underneath. These three distinguished specimens were entirely free from parasitic weeds, and were the only ones of their kind observed. Many crabs (Fig. 4), generally resembling Fig. 1 in shape, but altogether ruder in form, were found in plenty, all bearded with moss in the manner shown. While looking at these frail organisms, one was forced to conclude that there must surely be little disturbance in their habitats.

The temperature varied from 79° F. in the deeper water to 83° F. in the shallower. The cable was most thickly encrusted with vegetation in depths of thirty to forty fathoms, and there was a very sensible falling off when the depth reached sixty fathoms, and the water became salter and more free from silt.

The specimens, Figs. 1 and 2, were found in water of thirty and forty fathoms respectively, about lat. 0° 55′ N., long. 48° 8′ W., off the coast of Marajo, or Joannes Island.

The specimens, Figs. 3 and 4, were found in water of sixty fathoms, sixty miles off the coast, about lat. 2° 56′ N.

The few unlucky waifs observed of the many which came up are at least sufficient to hint at the wonderful variety of submarine life there may be in the littoral zones of these regions, which are well worthy of being examined by naturalists; and picking up cables suggests a novel way of dredging for them.

8. *Fishes' Bites.*—The cause of our picking-up operations is in itself worthy of remark. We found that the cable had been bitten in several places by fishes powerful enough to displace the iron sheathing and pierce the cable to the core with their teeth, pieces of which we found sticking in the bitten places. There is reason to believe that the electric current had given them a shock and caused them to quit their morsel rather hastily. The bites were all located in the cable off the Delta of the Amazon, and had undoubtedly taken place when the cable was freshly laid, and before it was rendered inconspicuous and unattractive by the submarine fauna and flora.

J. MUNRO

THE BIRMINGHAM COLLEGE OF SCIENCE

SOME months ago we intimated that Sir Josiah Mason had set aside a munificent sum of money wherewith to erect and endow a College of Science in Birmingham. On Tuesday last, his eightieth birthday, the donor laid the foundation-stone of the building, in presence of a large gathering, composed of representatives of various public bodies.

We have already given some details of Sir Josiah Mason's scheme, which appears to us exceedingly judicious, liberal, and comprehensive. The entire sum to be spent by the wise and generous founder will amount to upwards of 100,000*l.*, of which 65,000*l.* will be reserved for endowment. The plan of education comprises courses of instruction in mathematics, abstract and applied; physics, both mathematical and experimental; chemistry, theoretical, practical, and applied; the natural sciences, especially geology and mineralogy, with their application to mines and metallurgy; botany and geology, with special application to manufactures; physiology, with special reference to the laws of health; and the English, French, and German languages. The course of study may also, in the discretion of the trustees, include such other subjects of instruction as will conduce to a sound practical knowledge of scientific subjects, excluding mere literary education. It is provided that popular or unsystematic instruction may be given gratuitously or by fees in the discretion of the trustees, and shall be open to all persons without distinction of age, class, creed, race, or sex. Theology and theological or religious subjects are absolutely excluded from the curriculum. Students must be between the ages of fourteen and twenty-five, and must pass such preliminary examination as the trustees may direct. In exceptional cases, students above twenty-five will be admitted; but these must not exceed the proportion of one to ten. The founder has decided that a certain proportion must be selected on grounds which are reasonable and not too narrow. The original trustees are Mr. W. C. Aitken, Mr. J. Thackray Bunce, Dr. Gibbs Blake, Dr. Heslop, Mr. G. J. Johnson, and Mr. George Shaw, and the Town Council of Birmingham is empowered to appoint five additional trustees after the death of the founder. The building, which is in the early pointed style, from designs by Mr. J. A. Cossins, architect, of Birmingham, will occupy an area of about an acre, with frontages on either side of 149 feet and 127 feet respectively, in the immediate vicinity of the Town Hall, the Midland Institute, and the new municipal buildings.

After the ceremony of laying the foundation-stone, a meeting was held in the Queen's Hotel, at which, among others, Mr. John Bright was present, and paid a deserved tribute to the far-seeing liberality of the founder of the College. Sir Josiah Mason himself, in an address marked by moderation and great sagacity, gave a simple account of his own career, in which he has amassed a fortune by patient industry, and spoke with great emphasis of the